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*Published in:*  
Nordlyd

*Publication date:*  
2007

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Knüppel, A., Steensgaard, R., & Jensen de Lopez, K. (2007). Mental State Talk by Danish Preschool Children. *Nordlyd*, 34(3), 110-130.

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# **Mental State Talk by Danish Preschool Children**

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## **Abstract**

Sixteen 4 to 6-year-old Danish children were video-recorded, while interacting spontaneously with their family in their homes. The mental state talk of the children was identified and analysed with respect to three mental domains: desire, feeling and cognition, and was compared to data from a similar study carried out with Canadian families (Jenkins et al., 2003). Our results suggest some cross-cultural differences in children's mental state talk. First, Danish children produce a larger variation of mental state talk words than Canadian children do, and second, the distribution of mental state talk across the three domains differed for the two language groups. Semantic variation between Danish and English was identified in the study, which may partly explain the findings. Furthermore we present a usage-based approach to the investigation of children's development of psychological categories in language as well as cross-linguistically.

## **1. Introduction**

This study addresses Danish preschool children's first language acquisition of the psychological category of mental state talk by comparing their development with data from a previous study. Lexical acquisition traditionally distinguishes between two categories of word classes; dexical and indexical words. Dexical words, such as concrete nouns, are taken to be among the very first words acquired by children due to the fact that their reference is observable in the immediate environment. Indexical words, such as pronouns and adjectives, have showed to be more difficult for the child to acquire, given that their reference is not directly observable in the immediate environment. The category of words that refer to mental state talk, that is what goes on in the mind of a person, can be seen as indexical and abstract and thus predicted to be more difficult for children to acquire the use and meaning of than words that refer to concrete entities, also known as the mapping problem. However, people's understanding of mental state talk is crucial for our ability to understand the behaviour of others and for enabling others to understand our own behaviour. Developmental psychologists have showed a great interest in understanding how these abilities emerge in early childhood and estimate that learning to talk about mental states contributes to the child's development of a Theory of Mind, a central psychological construct that refers to the child's

This paper was supported by a grant from the Danish Agency for Science Technology and Innovation (273-07-0201) and a grant from Det Obelske Familie Fond awarded to the third author during a research period at the UNED, Madrid. Correspondence concerning this article should be addressed to Kristine@hum.aau.dk

*Nordlyd* 34.3:110-130, © Ane Knüppel, Rikke Steensgaard and Kristine Jensen de López 2007

*Papers from the Language Acquisition Workshop, SCL 2006*

Edited by Merete Anderssen and Marit Westergaard

CASTL, Tromsø. <http://www.ub.uit.no/baser/nordlyd>

understanding of other people's wishes, feelings and beliefs, which is important for the child's understanding and interpretation of other people's behaviour and therefore important for the child's social life (Astington, 1993; Wellman, 1990). From a language acquisition perspective, development of mental state talk informs us about which topics children focus on in their development of complex semantic language. Over the last decades there has been an increase in studies examining the mental state talk of children, and these studies show that children's mental state talk reveals an understanding of wishes, feelings and beliefs as being internal subjective states, and that mental state talk already appears as early as in the second year of life (Bartsch and Wellman, 1995; Wellman et al.; 1995).

Cognitive developmental psychologists divide the category of mental or internal states into three domains, which respectively mirror the domains used for identifying children's development of mental state talk; 1) talk which refers to *desires*, 2) talk which refers to *feelings* and 3) talk which refers to *cognition*. Interestingly, these domains of mental state talk do not develop in parallel and are not equally frequent in children's mental state talk. Studies of English-speaking children's development of mental state talk have shown that desire terms become evident in the child's spontaneous talk at around the age of 18 to 24 months and that the frequency of these terms increases up until the age of three years. However, the child's very early use of desire terms does not in most cases refer to internal states, but instead to goal directed behaviour, e.g. "I want a cookie", expressing the child's desire to obtain a cookie (Budwig, 2002). This suggests that young children employ lexical forms with restricted functions. By the child's third year of life desire terms have developed to express a clear understanding that people can have different wishes (Bartsch and Wellman, 1995). In addition Jenkins et al.'s (2003) study indicated that during the age of two to six years children use more desire terms than cognitive terms, and that feeling terms are the least frequent. Moreover, they find that the frequency of desire terms decreases in the mental state talk of four- to six-year-old children.

Starting their second year of life children begin to use mental talk about feelings as part of their spontaneous speech repertoire. For example, two year-olds are able to ascribe basic emotions such as happy, sad, scared and angry to toys, and they can use talk about feelings to affect other people (Dunn et al., 1987; Wellman et al., 1995). From the age of three to five years the domain of feeling talk increases to include more complex terms such as "surprise", "bored" and "lonely". In addition these feeling terms are now used in more complex contexts where the child is able to linguistically identify both the cause and the consequence of emotions and

to connect emotions with other mental states (Lagatutta and Wellman, 2002; Wellman et al., 1995). Talk about cognitive states is regarded as the most complex type of mental state talk and only becomes evident in the child's speech in the third year of life (Shatz et al.; 1983; Bartsch and Wellman, 1995). Cognitive talk includes terms such as "think", "believe", "know" and "remember" and the frequency of these terms increases with age at least up until the age of six years (Jenkins et al., 2003). However, the child's early use of cognitive terms is not characterised by the child referring to mental states, but instead can be characterised by the child's intention to lead a specific interaction with another person in a certain direction. Later on, cognitive terms are used as expressions of the child's own internal mental state representations (Shatz et al., 1983). Thus, overall it seems that the early acquisition of mental state talk reflects the child's progress from a non-conventional and non-adult-like usage to a usage which becomes more consistent with the conventional way of using mental state talk in a particular language community, and hence reflects a gradual process rather than an across-the-board learning strategy for developing the communicative tools necessary to express what is not immediately observable, namely internal states. In addition to a gradual developmental pattern Jenkins et al. (2003) find large individual differences in children's mental state talk across the three mental state talk domains, and Dunn et al. (1991) also find great variation in the frequency with which three-year-olds use feeling terms. These individual differences have been explained in terms of the autonomous character of the specific child, however they can also be an indication of what type of family the child is growing up in (Harris, 2005). Some families may speak more about feelings than desires, or they may speak more about cognitive states rather than desires.

In this sense, talk about mental and emotional states is mediated by socio-cultural factors such as the conventional rules regarding what types of internal states are overtly expressed in discourse within a specific culture or a specific family. Thus the semantics of mental and emotional talk varies across languages. The recent focus on language typology stresses the importance of taking into account cross-linguistic studies of child language development, and has recently made researchers become aware that very basic cognitive notions, such as our notion of spatial relationships, are expressed in radically different ways (Levinson, 2001, Jensen de López, 2002). The variation in how different languages slice up the spatial array (e.g. Korean conventionally expresses the notion of a tight-fit spatial relationship between two objects whereas English does not) is expressed in children's spontaneous speech about basic spatial relationships (e.g. the block is in the box) from the age of two years (Bowerman and Choi, 2001;

Jensen de López et al. 2005). This suggests that language can significantly influence the way children think about spatial concepts.

Early development of mental state talk has been documented for English-acquiring children, but there does not exist research addressing this development by children acquiring other languages than English. In addition most studies of children's mental state talk only include data from children up to the age of five and only examine a single category of mental state talk. One exception to these two latter issues is the Jenkins et al. (2003) study (henceforth referred to as the J. study), which investigates three domains of English-speaking Canadian children's mental state talk from the age of 1.9 to 7.0 years. In this study children's spontaneous speech was analyzed across three categories of mental state talk, namely desire, feeling and cognition. The majority of research in child language is restricted to early linguistic development, which in part is motivated by the fact that the major developmental milestones emerge during the first years of the child's life. However, as pointed out by Karmiloff-Smith (1992) all areas of language are far from fully developed at the age of four and recently researchers have started to investigate the mechanisms underlying children's so-called late language development. The present study is an exploration of such late language development of mental state talk by Danish-speaking children. We ask questions similar to those posed in the J. study, namely what does the development of mental state talk look like after the age of four? We also pose the question of whether the pattern described for Canadian-speaking children's mental state talk is universal. Although Denmark and most English-speaking countries are Western societies, and therefore may be equivalent in the mental domains their speakers express mental state talk within, the overall aim of this study is to investigate whether this is actually so. If language development reflects universally developing cognitive categories, we might expect all children to express similar general domains of cognitive categories in their mental state talk at similar ages. In other words, we ask whether the result for English-speaking children's mental state talk can be generalized with regard to Danish-speaking children? We provide descriptive data of Danish children's mental state talk and compare the frequency and the distribution of Danish children's mental state talk with that of Canadian children. Thus this study in part replicates the J. study and in addition, it is the first study to offer data on spontaneous mental state talk by Danish-speaking children aged four to six years. We therefore find it relevant to present the aim and methodology of the J. study in detail before presenting our study.

The aim of Jenkins et al's (2003) longitudinal study was to examine how the family context affects the development of children's talk about the

mind. They examined whether family factors, such as sibling position, parent gender and child gender were associated with children's development of mental state talk. The families were Caucasian and lived within the same area in Canada. The data was collected during 90-minute observational sessions in the families' homes, with an equal division of mother-only-sessions and mother-father-sessions. The observer followed the children and dictated onto one track of a stereo audiotape a descriptive account of all the children's interactions and of all parental behaviour that related to the children's interaction. During these everyday activities the rate of mental state talk was found to be low, as in other studies of English-speaking children (Bartsh and Wellman, 1995; Dunn, Brown and Beardsall, 1991). The exact rate of the children's mental state talk is shown in Table 1.

Table 1. Distribution of the three domains of mental state talk by age group for the J. study.

Mean rates of mental state talk per hour	<b>Desire</b>	<b>Feeling</b>	<b>Cognitive</b>
For the two year-olds	1.77	0.37	0.19
For the four year-olds	4.0	1.1	2.5
For the six year-olds	5.2	1.4	5.0

The results in Table 1 show that desire terms were overall more common than cognitive and feeling terms. A repeated-measures ANOVA indicated that cognitive talk increases with age, and talk about desire and feelings decreases with age (from 2 to 6 years). The change in the younger children's (2-4 years) cognitive talk was predicted by exposure to cognitive talk from mothers, fathers and children 2 years earlier. The older children's (4-6 years) increase in cognitive talk could not be explained by these factors. The study concludes that family factors are important for the development of mental state talk when children are 2-4 years old, but after that children's talk is influenced by factors more intrinsic to the children, such as their previously established developmental trajectory.

Following the results reported in studies investigating English-speaking children's development of mental state talk, we predicted an increase in the children's production of cognitive mental state terms (henceforth referred to as MSTs) from the age of four to the age of six. However, given that Danish offers a larger variation of MSTs compared to what is reported in the Canadian study, we predicted that Danish children would produce a higher frequency of mental state talk compared to Canadian-

speaking children. The motivation for the second prediction emerged from our results obtained in the course of developing the coding criteria used to code Danish mental state talk and hence forms part of the present study.

## 2. Method

### 2.1. *Participants*

Sixteen Danish children and their parents participated in the study. Eight of them were between 4.1 to 4.9 years of age ( $M = 4.6$  years,  $SD = .29$ ), while the remaining children were between 6.2 to 6.9 years of age ( $M = 6.5$ ,  $SD = .23$ ). Both age groups were balanced for gender, and all the families included one or more siblings: Eight children had older siblings and eight children had younger siblings. The children's first language was Danish. All fathers and mothers were employed outside the home, and based upon their income the families had a medium to high socioeconomic status<sup>1</sup>. Of the 16 families, nine mothers had taken higher education (three to five years after Secondary school), six mothers had a medium education (four years after Secondary school) and for one mother we did not have the information. We started our sampling in the area around the University of Aalborg and expanded the recruitment to most of Denmark.

### 2.2. *Procedure*

Similar to the J. study we made use of naturalistic observation. The families were informed that the aim of the study was to investigate children's communicative skills within the family, and were given a video-recorder with the instructions to videotape one hour of everyday activities (e.g. playing games and eating) during a weekend. The only restriction was that the recording should start with an eating scene where the whole family was present. This guaranteed that the target-child always was in the same room as one of the parents. Siblings were also present in some of the recordings. The notion of naturalistic data was emphasized by the fact that the researcher was not present during the recording. The first 30 minutes of the video-recordings were transcribed in CHAT format, starting from the 5<sup>th</sup> minute of the recording.

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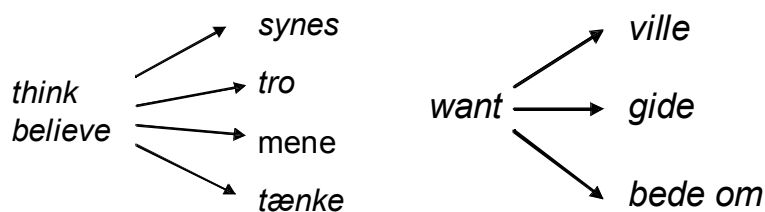
<sup>1</sup> Note that Denmark does not have a large range of socioeconomic classes (see Report from Cepos).

### 2.3. Coding of Mental State Terms

Due to the non-existence of previous studies describing Danish children's mental state talk, we initially relied on the list of MSTs reported in the J. study. We started by translating the English terms identified in the J. study, which for the purpose of the J. study had been derived by collecting all the terms from previous observational studies of children's mental state talk (Shatz et al. 1983; Dunn et al. 1987; Dunn et al., 1991; Perner, 1991; Moore et al. 1994; Bartsch and Wellman, 1995 and Hughs and Dunn, 1999). Talk about the mind can be assessed based on different criteria. For example "know what?" can be ambiguous as to whether the child is referring to the mind or simply asking the listener to pay attention. In accordance with the J. study we relied on an inclusive coding approach, i.e. the context within which the term was uttered determined whether the word was included as a mental state talk term. Following the J. study we divided the children's mental state talk into three categories of talk: desire, feeling and cognitive talk. The terms included in the desire category were: *want*, *hope*, *wish* and *care*. The feeling terms were: *sad*, *hurt*, *angry*, *happy*, *excited*, *love*, *dislike*, *like*, *afraid*, *enjoy*, *fun*, *glad*, *mad*, *scared*, *upset*, *surprise*, *fear*, *disgust*, *good* and *make a fuss* and for the cognitive category the terms were *think*, *know*, *believe*, *wonder*, *remember*, *forget*, *guess*, *pretend*, *understand* and *expect*.

The translation process was generally hampered by the fact that the dictionary offers several possibilities for Danish translations of each of these terms. To illustrate this the English words "think"/"believe" translate into four very commonly used Danish mental verbs, namely "tro", "synes", "mene" and "tænke", and the English word "want" can be translated into no less than three Danish terms, namely "ville", "gide" and "bede om" (see Figure 1).

Figure 1: Illustrations of the one-to-many mappings between English mental verbs and Danish mental verbs for "think" and "want".



When analyzing the Danish data we became confronted with the question of whether to include all possible translations in the list of what counts as a MST in Danish, or to choose just one translation for each term in order to make the coding definitions more comparable to those



employed in the J. study. We decided to analyze the data using two sets of criteria; a rigid and a soft criterion. In the analyses that followed the rigid criterion we relied on the list used in the Canadian study, which was representative of the specific terms produced in the data. We consulted the English-Danish dictionary to find translations of each English MST. Due to the fact that the dictionary often provided us with several possible translations for some of the specific English MSTs we followed the J. study's criterion for selecting which Danish MSTs to add to the list. A second criterion in the rigid coding was that all three authors recognized the term as a commonly uttered term used by young children and parents. When in doubt we consulted the connotations used by the J. study. We then cross-checked our Danish translations by carrying out a back-translation with the Danish-English dictionary until we reached a 100 % match with the Jenkins et al. (2003) items. Table 2 illustrates the list of Danish terms used in the rigid coding.

Table 2: The terms included in the analyses following the rigid criterion.

<b>Desire terms</b>	<b>Feeling terms</b>
Ville (want)	Bedrøvet (sad),
Håbe (hope)	Gøre ondt (hurt),
Ønske (wish)	Vred (angry),
Tænke sig noget (care)	Sur (mad),
	Glad (glad),
	Lykkelig (happy),
	Hidse sig op (excited),
	Elske (love),
	Kan ikke lide (dislike),
<b>Cognitive terms</b>	Kan lide (like),
Synes (think),	Bange (afraid),
Vide (know),	Nyde (enjoy),
Tro (believe),	Sjov (fun),
Undre (wonder),	Uhyggelig (scared),
Huske (remember),	Ked af det (upset),
Glemme (forget),	Overrasket (surprise),
Gætte (guess),	Frygt (fear),
Lade som om (pretend),	Væmmelse (disgust),
Forstå (understand),	Godt (good)
Forvente (expect)	Skabe sig (make a fuss)

In the second analysis we followed the soft criterion and added to the list of MSTs all the possible translations of a specific mental state term; e.g. "tro" and "synes" as the equivalent to "think". This was a usage-based and data-driven approach in that all the mental state words were uttered in the recordings. Table 3 illustrates the words that were included in the soft coding. In this second analysis we therefore searched the data for a larger amount of MSTs in total compared to the J. study.

Consistent with the J. study there were a number of reasons for excluding a term from the analysis. These were: unclear meaning of a term, sentence fragment, repetition of own or others' utterance and nonverbal expressions of a feeling such as crying or laughing. In addition to this there were certain exceptions linked to specific terms (for details see Jenkins et al., 2003).

Table 3: The terms included in the analyses following the soft criterion.

<b>Desire terms</b>	<b>Feeling terms</b>	<b>Cognitive terms</b>
<i>Vil</i> (want)	<i>Ked af det</i> (sad)	<i>Tro</i> (think)
<i>Gide</i> (want)	<i>Trist</i> (sad)	<i>Synes</i> (think)
<i>Bede om</i> (want)	<i>Såret</i> (hurt)	<i>Tænke</i> (think)
<i>Håbe</i> (hope)	<i>Ondt i</i> (hurt)	<i>Mene</i> (believe)
<i>Ønske</i> (wish)	<i>Vred</i> (angry /mad)	<i>Vide</i> (believe)
<i>Lyst til</i> (wish)	<i>Sur</i> (angry /mad)	<i>Kende</i> (believe)
<i>Tænke sig noget</i> (wish)	<i>Gal</i> (angry /mad)	<i>Undre</i> (wonder)
<i>Ligeglad med</i> (care)	<i>Muggen</i> (angry /mad)	<i>Spekulere</i> (wonder)
<i>Glad for</i> (care)	<i>Glad</i> (happy /glad)	<i>Huske</i> (remember)
	<i>Lykkelig</i> (happy)	<i>Glemme</i> (forget)
	<i>Spændt</i> (excited)	<i>Gætte</i> (guess)
	<i>Hide sig op</i> (excited /upset)	<i>Gå ud fra</i> (pretend)
	<i>Elske</i> (love)	<i>Forestille</i> (pretend)
	<i>Kan ikke lide</i> (dislike)	<i>Lade som om</i> (pretend)
	<i>Bryde sig ikke om</i> (dislike)	<i>Forstå</i> (understand)
	<i>Kan lide</i> (like).	<i>Forvente</i> (expect)
	<i>Bange</i> (afraid)	
	<i>Nyde</i> (enjoy)	
	<i>Sjov</i> (fun)	
	<i>Skør</i> (fun)	
	<i>Uhyggelig</i> (scared)	
	<i>Forskrækket</i> (scared)	
	<i>Overrasket</i> (surprise)	
	<i>Frygt</i> (fear)	
	<i>Væmmelse</i> (disgust)	
	<i>Godt</i> (good) only when it refers to a mental condition	
	<i>Skabe sig</i> (make a fuss)	

All grammatical variation of each term were included; hence we did not restrict the analysis to any specific class of words, but simply explored all the terms used by the children to express a mental state within the categories of desire, feeling and cognition. This implied that each of the child's utterances was closely inspected within its contextual use for whether the child expressed a mental state, either its own or that of another person. The lexeme expressing the mental state was then included in the analyses.

It should be made clear that we tried to match our methodology as closely as possible with that of the J. study. However, methodology will always remain a main issue in a cross-linguistic study and we do not claim to have totally resolved this issue. One particular difference in two respective studies is seen in the prior information given to two groups of

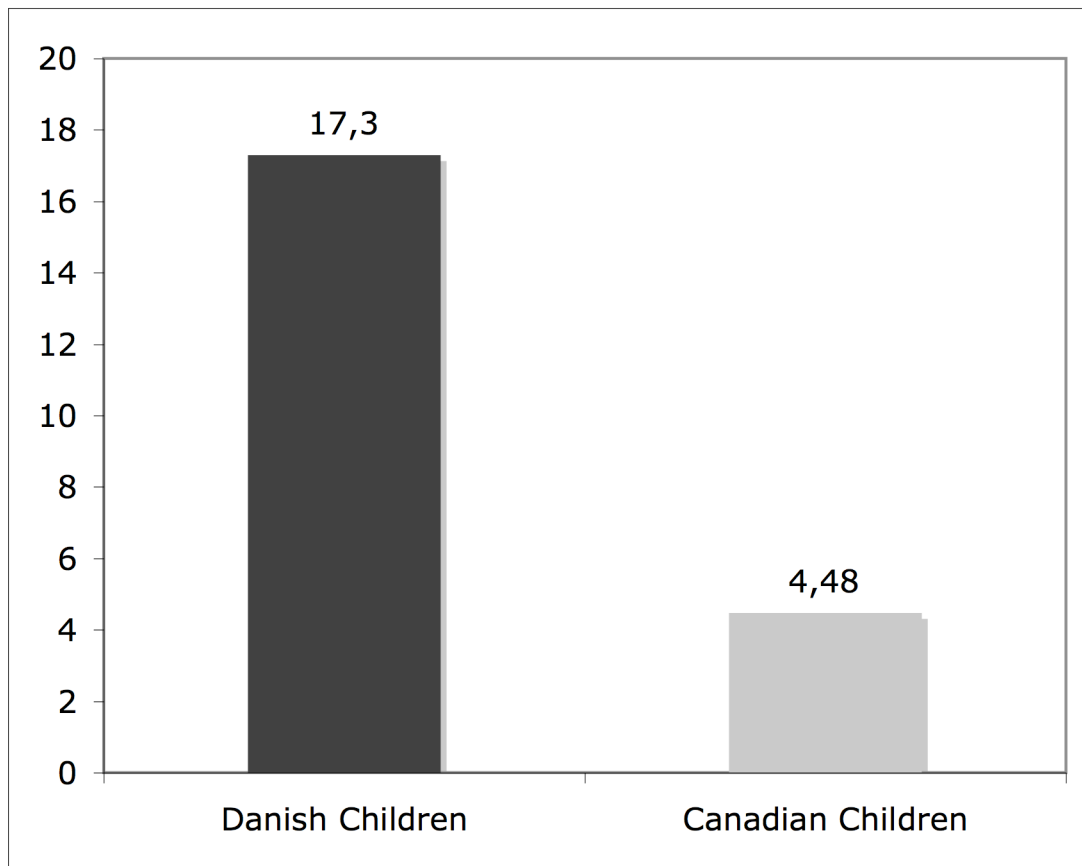
families regarding the purpose of the specific studies. While the data in the J. study was originally collected to examine how parents intervened in their children's conflicts, our data were collected to analyse child language development. This slight difference might have had the effect that the Danish as apposed to the Canadian families engaged in different kinds of activities with different levels of communication. Fortunately, it became evident that the kind of everyday activities the Canadian families were reported to be carrying out were quite similar to the everyday activities the Danish families were engaged in, e.g. eating and drinking, playing games and drawing. Thus we do not find that the slightly different research purposes affected the comparison of the results. As mentioned earlier it is important to note that studies of English-speaking children's mental state talk (Jenkins et al. (2003); Bartsch and Wellman, 1995; Dunn, Brown and Beardsall, 1991) find a low frequency of MSTs in the speech of preschool children. In the present study two independent coders carried out the coding with the inter-judge reliability rate reaching approximately 85%. Agreement between the coders was reached through discussion.

### **3. Results**

In our first analyses we employed the rigid coding criterion to identify the total proportion of MSTs produced by the Danish children. In order to carry out a comparison of our results with the results reported in the J. study we divided the frequency of MSTs used by Canadian children in two. This decision was based on the fact that the J. study operates with rates per hour whereas we operate with rates per half hour. In contrast to the results reported in the J. study, as well as those reported in similar studies carried out with English-speaking children, we did not find a low rate of mental state talk expressed by the Danish children. Figure 2 shows the marked difference between the Danish and the Canadian children when comparing the frequency of mental state talk produced by the two groups of children.

## MENTAL STATE TALK BY DANISH PRESCHOOL CHILDREN

Figure 2: Mean rates per half hour for Danish and Canadian children's Mental State Talk.

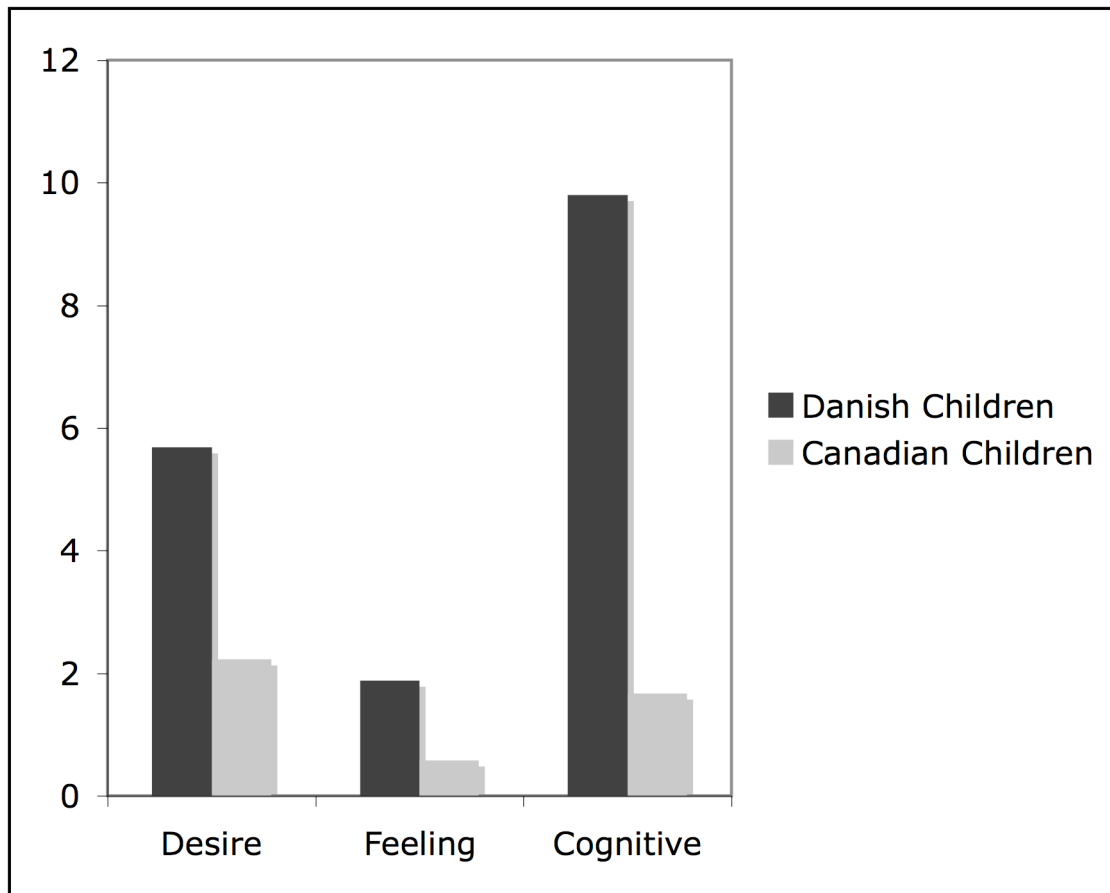


The Danish children expressed a mean of 17 MSTs during the half hour session, whereas the Canadian children expressed a mean of 4 MSTs<sup>2</sup>. We then analyzed the data by categorizing the children's mental state talk into three domains: desire, feeling and cognition. As can be seen in figure 3, the marked differences in the frequency of MSTs produced by each of the groups were also present within the three mental state talk domains.

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<sup>2</sup> Although an independent-sample t-test would be able to measure the statistical significance of the differences, this was not possible due to our lack of access to the Canadian raw data.

Figure 3: Means of mental state talk for Danish and Canadian children for the domains desire, feeling and cognition.

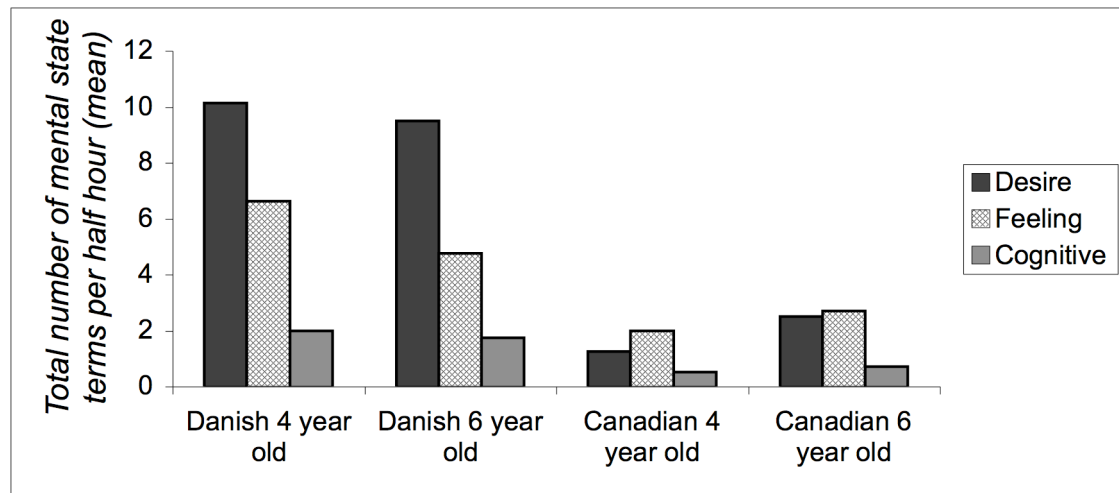


Thus the Danish children produced a relatively higher average of overall mental state talk words compared to the Canadian children across the three domains. The analyses of the distribution of the three categories of mental state talk showed that the Danish children produced a higher frequency of cognitive MSTs followed by desire and feeling terms. This pattern differs from that produced by Canadian children, who produced more desire MSTs followed by cognitive and finally feeling MSTs.

### 3.1. Developmental Trends

We then split the data into the two age groups of 4-year-olds and 6-year-olds in order to investigate whether the cross-linguistic differences held up within each of the age groups. As can be seen in Figure 4, the Canadian children's mental state talk increased overall from the age of four years to the age of six years. Jenkins et al. (2003) emphasized the fact that children's cognitive talk increased significantly over time.

Figure 4: Means of rates per half hour in mental state talk for four- and six-year-old Danish and Canadian children.



However, this was not the case for the Danish children, as their overall amount of mental state talk decreased from age four to six (from a mean of 19 to a mean of 16), and the proportion of MSTs within each of the three domains of mental state talk also decreased with age.

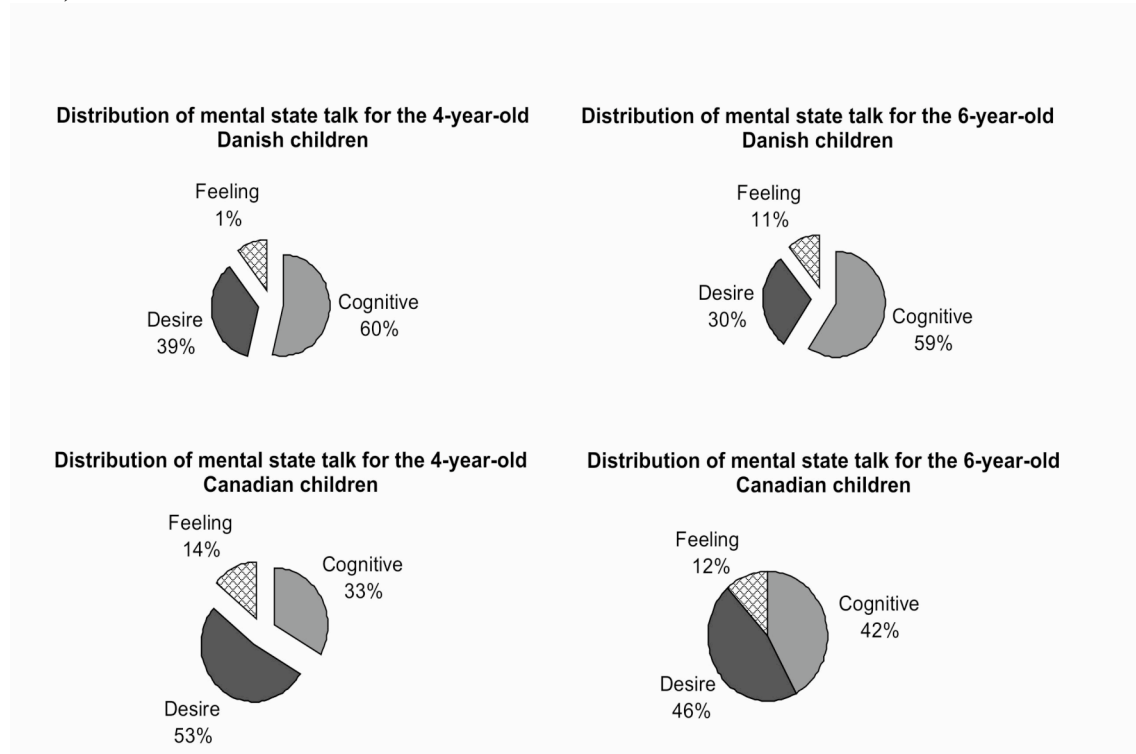
The results for the two age groups are illustrated in the pie charts of figure 5, which shows the proportional distributions. The Danish distribution of the three categories was valid regardless of the children's age and gender. At the age of four and six the Danish children produced a relatively larger proportion of cognitive MSTs as opposed to desire and feeling terms, respectively 60% and 59%. The proportion of cognitive terms was in fact almost twice as high as the proportion of desire terms in both age classes 60% versus 39% for the 4-year-olds and 59% versus 30% for the 6 year-olds. Furthermore, the Danish 4-year-olds hardly ever produced feeling MSTs (1%).

The general distribution pattern for the MSTs produced within as well as across the two age groups of Canadian children revealed a more even distribution pattern, however<sup>3</sup>. In contrast to the Danish 4-year-olds, the Canadian 4-year-olds produced desire MSTs as the most frequent domain (53%) followed by the proportion of cognitive MSTs (33%) and finally, the least frequently produced MSTs were feeling MSTs (14%). Note that Canadian 4-year-olds produce a much higher frequency of feeling MSTs compared to the Danish 4-year-olds. At the age of six, however, the between-group asymmetries were less salient, with the Danish children

<sup>3</sup> Note the calculations for the distribution of MSTs for the Canadian children are based on our calculations of the results presented in Jenkins et al.'s (2003) longitudinal study.

producing a similar proportion of feeling MSTs as the Canadian children and the Canadian children producing similar proportions of desire and cognitive terms (46% versus 42%).

Figure 5: The distribution of MSTs in Danish and Canadian children (4- and 6-year-olds).



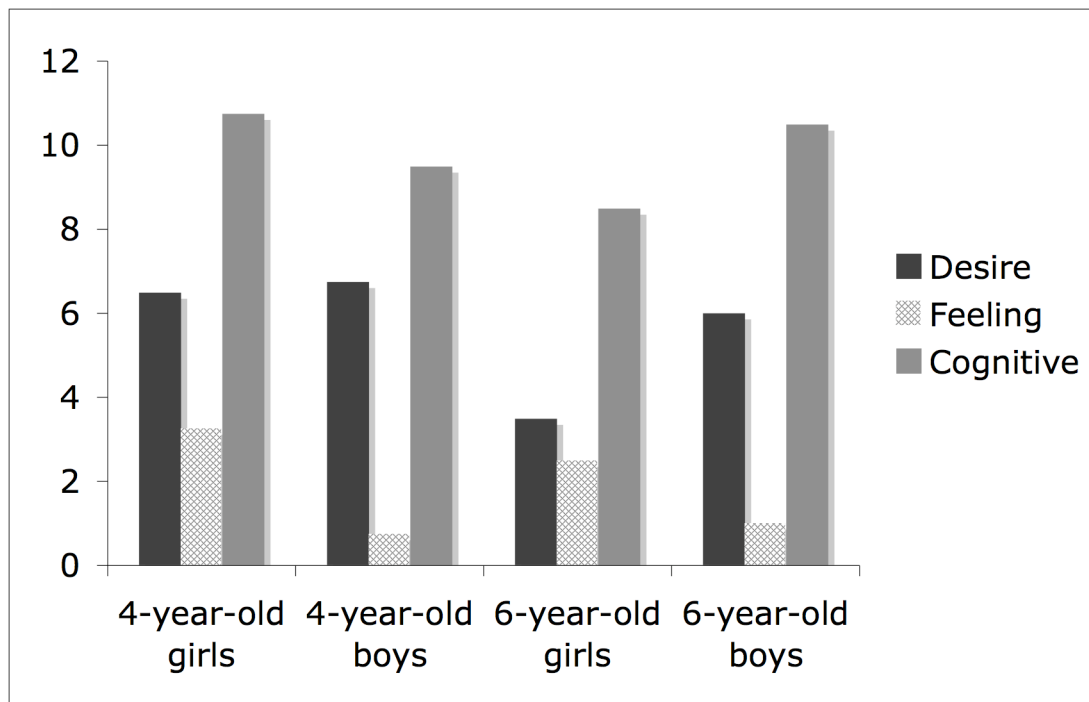
This suggests that the Canadian children go through a transition period between the age of four and six regarding the forms they use for expressing desire and cognitive mental states, whereas the Danish children's transition concerns the expression of desire and feeling mental states. For example the transition for the Canadian children seems to express the children's gradual change of focus from mental state talk about desire (e.g. *I want*) to mental state talk about cognition (e.g. *I think*). The difference between the two language groups suggests that mental state talk develops from talk about desire to talk about cognition; however, the exact age at which this transition takes place might be language-dependent rather than relying on a universal mechanism.

### 3.2. Distribution of MSTs across Gender

We then asked whether differences within age group were influenced by gender. It was only possible to carry out this analysis for the Danish group. In figure 6 we illustrate the distribution of MSTs across the three domains

of desire, feeling and cognition, showing that the distribution present for the whole group remains, regardless of age and gender. This supports the overall results by suggesting that across age and gender Danish preschoolers express more MSTs within the category of cognitive terms followed by desire terms and finally feeling terms.

Figure 6: The distribution of MSTs for the Danish children by gender (mean MSTs per half hour).



Although the overall pattern for expressing mental state talk is similar across age, the data revealed a small difference across the genders. At the age of four the Danish girls tended to produce slightly more cognitive and feeling terms than the boys did, whereas at the age of 6 years the pattern for the cognitive terms was reversed, in that the boys produced more cognitive terms compared to the girls. Interestingly, the boys produced overall fewer feeling MSTs compared to the girls. This difference may be explained by socialization factors, where it is less legitimate that boys express feelings than girls do.

The most significant finding of the study is that there is a strikingly higher frequency of mental state talk in Danish children as opposed to Canadian children. In addition, the distribution of mental state talk across the three categories is different for Canadian versus Danish children regardless of age.



### 3.3. *The Soft Coding of MSTs*

In order to clarify whether the between-group differences were flawed by methodological differences, specifically due to the fact that MSTs are not easily translated from one language to another, we carried out a soft analysis of the data. In this second analysis we included all the possible Danish translations of the MSTs that appeared on the Jenkins et al.'s (2003) - the J. study - word list rather than translating each term with just one Danish word per item (as was the criterion in the rigid coding approach). This analysis was regarded as the soft coding approach. The soft analysis was hence based on a total of 52 Danish MSTs (all derived by the data) whereas the rigid analysis included a list of only 34 words. We found that, when following the soft coding, Danish children in average used 25.5 MSTs per half hour, whereas the number was 19.01 when following the rigid coding. We reanalysed the data in accordance with the three domains of mental state talk and found the exact same pattern of distribution. The children produced an average of 9.5 cognitive MSTs followed by 7.4 desire MSTs and finally only 2 feeling MSTs. Hence the results of our soft analysis replicated those of our rigid analysis, suggesting that the difference between the Danish and Canadian children's production of mental state talk, when interacting spontaneously with their parents, differs in frequency and in the distribution across the mental state domains independently of whether the criteria followed in the analysis is data-driven or not. Regardless of which coding approach we used the Danish children produced a larger variation (more types) of MSTs compared to the Canadian children. The results challenge the claim that mental state talk appears infrequently in the spontaneous speech of 4- to 6-year-old children when interacting with their families.

## 4. Discussion

Previous research on young children's acquisition of mental and internal state language, such as mental state talk, suggests a uniform developmental progress with desire terms being the first to develop, followed by feeling and finally cognitive terms. However, when we turn to language development at a later age and in addition compare mental state talk across two different languages we find different developmental tendencies. Firstly, we see that Danish children produce a higher frequency of mental state talk than has been reported for children acquiring English. There does not seem to be any obvious methodological explanation towards why this should be the case, as the Canadian data that we compared our Danish data with were similarly collected in a naturalistic home setting. We acknowledge that had

we had access to the raw data for the Canadian group, this would have made a more exact comparison possible; however, given the large amount of discrepancy in our studies we feel confident in stating that a cross-linguistic and/or cross-cultural difference does exist between the two groups of children. There are at least two plausible factors, which may explain these differences: 1) the language typology hypothesis, and 2) the pragmatic socialization hypothesis.

Following the language typology hypothesis we might explain Danish children's relatively high production of mental state talk as being partly due to the fact that Danish, compared to Canadian English, has a larger lexicon for expressing mental state talk and that Danish speakers conventionally might use a more varied language for speaking about mental or internal states. Although we do not have strong evidence for this hypothesis, the phenomenon may lead Danish children to develop larger vocabularies for expressing mental state talk at an early age. This view is consistent with the revised version of Whorf's linguistic relative hypothesis (Whorf, 1956) as recently proposed for language development by Bowerman and Choi (2001). Based on a comparative study of the elicitation of children's basic spatial language at the age of two, their studies show that the specific way the child's language partitions the spatial array influences how the child uses language to categorize spatial relationships. That is to say that children may come to language with universal categories regarding how entities or ideas form categories; however, once they begin to develop language as a symbolic system used to refer to these entities or ideas, they must readjust their prelinguistic categories to fit with the categories available and conventionally employed in their native language. For example, children may possess some knowledge of mental states prior to acquiring the language of mental states, and the task of acquiring the specific meanings of conventional linguistic symbols such as these used to refer to specific types of mental states may broaden and differentiate the child's cognitive representations. There are, however, major differences in what the Bowerman and Choi study showed and what the linguistic-specific pattern of our study of Danish children's mental state talk shows. Firstly, the children in our study are much older than the children in the Bowerman and Choi study and therefore have a more sophisticated language, and secondly, our analysis mainly allows us to conclude on differences in vocabulary and lexical variation.

In a preliminary analyses of the MSTs produced in Danish parents' child-directed speech we discovered that the frequency of these terms exceed what is reported for child-directed speech addressed to English-acquiring Canadian children. The pattern we found for the Danish

children's mental state talk reflects the cross-linguistic variation seen in the parents' speech to their children from a relatively early age.

Methodologically, it is important to note that when we converted the Jenkins et al. list of MSTs into Danish we did not divide these into the three domains of feeling, desire and cognition from the very beginning. The division was driven by the analysis, meaning it was in accordance with the pragmatic function each term was used to express by the children, whether this was to express a desire, a feeling or a cognitive state, rather than starting out with an ad hoc division of the MSTs in the three mental state talk categories. We believe this approach strengthens the plausibility, that Danish toddlers produce cognitive mental state talk more frequently than is reported for Canadian toddlers.

However, it is not clear why Danish children produce more cognitive MSTs than Canadian children do. Cognitive MSTs may develop in synchrony with the child's development of a theory of points-of-view, involving the ability to understand that other people may have different minds than the child himself. The development of a theory of mind at around the age of four might explain the increase in the Canadian children's production of cognitive MSTs from the age of four to the age of six, whereas it cannot explain the high level of cognitive MSTs produced by the Danish children at the age of four. It could thus be argued that the discrepancy between the two groups of children with the Danish children being more advanced in their cognitive mental state talk at the age of four could suggest that Danish children develop a Theory of Mind earlier than the Canadian children. However, Danish studies of the development of theory of mind show that this does not seem to be the case (Jensen de López, 2005). An alternative explanation of the discrepancy is that it is due to the overall relatively high frequency of MSTs produced by Danish children and their families. This may enable them to reorganize their mental state talk and distinguish more clearly between the three categories of feeling, desire and cognition at an earlier stage than the Canadian children.

Finally, the socialization hypothesis - which is compatible with the language typology hypotheses - should also be seen as a factor influencing children's acquisition of mental state talk. Danish parents seem to speak more frequently about mental and internal states to their children than the J. study reported for Canadian parents. Our preliminary analyses of child-directed speech shows that the proportion of MSTs expressed by the Danish parents correlates with the proportion produced by the children. Given these differences, we suggest, in accordance with the theorizing of Vygotsky (1978), that Danish parents' discourse with their children and

mental state talk may be the primary linguistic device for directing children's awareness to the inner/mental states of others. Future research on mental state talk should extend the analysis to include the pragmatic functions underlying children's mental state talk as well as the parental discourse to children. This would provide more answers to the question of whether and how specific interactions between preschool children and their parents or social practices may influence children's late conceptualization and talk about the mind. It would also contribute to our general understanding of word learning in late language development as related to complex socio-cognitive abilities.

## 5. Conclusion

The present study of preschool Danish children's production and variety of mental state talk showed an unexpected overall high proportion of mental state talk terms compared to what is reported in the literature for Canadian English-acquiring children. When analysing the data into the three domains of mental state talk, we found that Danish children produce a greater frequency of cognitive terms than Canadian children and also that the Danish children seem precocious compared to the Canadian group. Hence we were not able to identify an expected increase in the children's production of cognitive terms from the age of four to six, although we did find a slight decrease in the children's production of desire MSTs and an increase in their production of feeling MSTs. The cross-linguistic differences may be explained in terms of differences in the quantity as well as meanings underlying MSTs in Danish compared to Canadian English, and in terms of the impact of family input. Further analyses are required to investigate the impact of family input. The study illustrates the methodological difficulties in investigating psychological categories, such as mental state talk cross-linguistically and offers a methodology to overcome these typological difficulties.

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